



## TRACE ELEMENT PLANT TISSUE TESTS

MODEL PT-04 • CODE 5261

QUANTITY	CONTENTS	CODE
30 mL	*Manganese Reagent #1	*5262-G
30 mL	*Manganese Reagent #2	*5263-G
15 mL	*Ferrous Iron Reagent	*5264-E
15 mL	*Ferrous & Ferric Iron Reagent	*5265-E
15 mL	*Copper Test Solution	*5267-E
30 g	*Zinc Reagent Powder	*7393-G
60 mL	Deionized Water	5115PS-H
50	Copper Test Papers	5266-H
50	Boron Test Papers	5268-H
24	Polyethylene Strips (12 perforated, 12 plain)	1196
1	Spoon, 0.5 g, plastic	0698
1	Pipet, 1 mL, plastic	0354
1	Test Tube, plain, glass, w/cap	0231
1	Pipet, plain, plastic w/cap	0357
1	Pipet, plain, glass	0342
1	Pipet, plain, glass w/cap	0341
1	Filter Paper, 100 sheets	0471

**\*WARNING:** Reagents marked with a \* are considered to be potential health hazards. To view or print a Material Safety Data Sheet (MSDS) for these reagents see MSDS CD or our website. To obtain a printed copy, contact us by e-mail, phone or fax.

To order a complete set of refill reagents, order as R-5261. To order individual reagents or test kit components, use the specified code number.

## **INTRODUCTION**

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Tissue testing is based on the knowledge that, for most nutrients, the first indication of a deficiency is the disappearance of the nutrient in a soluble form from the plant sap. Therefore, chemical tests capable of detecting the presence or absence of a nutrient in the sap can indicate the presence or absence of a nutritional stress within the plant.

This kit contains trace element tests for ferrous and ferric iron, boron, manganese, copper, and zinc. These tests are essentially “spot tests” which are carried out on the plant sap absorbed on filter paper.

For best results, we recommend analysis of material from plants displaying deficiency or toxicity symptoms and from healthy plants not showing these effects. In most cases, the nutrient disappears first from the oldest leaves then from the young leaves, and last from the basal stalk of the plant. It may be advantageous to test both old and new tissue, but generally a test should be made on the leaf sheaths or, with very young plants, on the stalk. For small grains and alfalfa, the stems are used, while for beets, beans, potato, tomato and geranium, the leaf petioles are used.

## **COLLECTION OF PLANT SAP**

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In these tests, sap is expressed from freshly cut plant tissue onto a strip of filter paper. In the case of copper and boron, the test reagents are impregnated in the filter paper. The tests are carried out on the filter paper on which the sap has been absorbed. Collect the sap in the following manner:

1. Place the plant tissue to be tested between two pieces of perforated polyethylene (to minimize contact of the green tissue with the paper to reduce staining of the paper).
2. Fold a piece of filter paper over polyethylene.
3. To avoid contamination from the metal pliers, fold an outside layer of plain polyethylene over the filter paper.
4. Squeeze with the pliers until spots of sap are observed on the filter paper.
5. Complete the chemical tests.

**NOTE:** It is advisable to run a blank test to take into account any interferences that may occur from the reagents. This is done by performing the tests on a drop of deionized water at the same time the plant sap is being tested.

*The tests described below largely follow the methods described by Dr. S.R. Melstead of the University of Illinois.*

## **MANGANESE**

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1. Use plain filter paper (0471) to collect plant sap.
2. Use the glass pipet (0341) to add 1 drop of \*Manganese Reagent #1 (5262) to area containing sap. Wait 30 seconds.
3. Use plain pipet (0342) to add one drop of \*Manganese Reagent #2 (5263). Wait one minute.
4. The area will turn blue if sufficient manganese is present.

## **IRON - FERROUS AND FERRIC**

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1. Use plain filter paper (0471) to collect plant sap.
2. Use the plastic pipet (0357) to add one drop of \*Ferrous Iron Reagent (5264) to a spot of sap.
3. Add one drop of \*Ferrous & Ferric Iron Reagent (5265) to a second spot of sap.
4. The area(s) will turn red if sufficient iron is present.

## **ZINC**

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1. Use plain filter paper (0471) to collect the plant sap.
2. Prepare Zinc Reagent in the following manner:
  - a. Use the 1.0 mL pipet (0354) to transfer 1 mL of Deionized Water (5115PS) to a test tube (0231).
  - b. Use the 0.5 g spoon (0698) to add 0.5 g of \*Zinc Reagent Powder (7393). Mix. The mixture will contain some undissolved material. It should be discarded at the end of the day.
3. Add one drop of the prepared reagent to the area on the filter paper containing a spot of sap. Wait 2-3 minutes.
4. The area will turn blue if sufficient zinc is present.

## **COPPER**

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1. Use a Copper Test Paper (5266) to collect the plant sap.
2. Add 1 drop of \*Copper Test Solution (5267) to an area of the paper containing a spot of plant sap.
3. The area will turn blue if sufficient copper is present.

## **BORON**

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1. Use a Boron Test Paper (5268) to collect the plant sap.
2. Outline a spot of the plant sap with a pencil and mark a spot of similar size on another strip of test paper. Add one drop of Deionized Water (5115PS) to second strip.
3. After a few minutes, the area which has the plant sap should turn a bluish to a purplish color. No color should appear in the deionized water blank. If a difference of color exists, the plant contains sufficient boron.

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